

WEB BLIGHT AFFECTS SEED YIELD AND QUALITY OF MOTTLED BEAN LINES/ CULTIVARS IN THE DOMINICAN REPUBLIC.

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Web blight (WB) of common bean is caused by aerial isolates of *Rhizoctonia solani*, teleomorph *Thanatephorus cucumeris* Frank (Donk). The disease is endemic in bean growing regions of Latin America and the Caribbean (Galvez et al., 1989; Godoy et al., 1996). In the Dominican Republic (DR), a widely grown cultivar with red mottled seed, PC-50, is susceptible to WB and losses have been documented (Godoy et al., 1996). In white and colored seeded beans, the WB pathogen was associated with blemished and discolored seed resulting in reduced market value. New red mottled lines with a broader genetic base have been made available to farmers through a collaborative Bean/Cowpea CRSP breeding project. The present study was undertaken to quantify the effect of WB on yield components of these new lines and to measure yield effects of late season WB control.

Field experiments were established in 1995 and 1996 in Buena Vista (400 masl) Dominican Republic where severe *R. solani* AG-1-IB infection occurs annually. A randomized complete block design with split plots with four replicates was used. The main plots were fungicide treated and non treated. Subplots were red mottled bean cultivar/lines: PC-50 (landrace Pompadour Checa selection) JB-178 (selection from Jose Beta x C1308) PC-21-SM-A and PC-21-SM-E (selection from PC-50 x BAT-1274) AL-9014-9 (selection from PC-50 x Constanza). In 1996 NE-8955-66 (origin unknown) was included. Fentin acetate (Brestan 60) at 0.6 kg/ha was sprayed 15, 25 and 40 days after seeding to control WB. In 1996 an additional fentin acetate spray was applied at 50 days after seeding to prevent fungal development on maturing pods. Disease evaluations were conducted at 2 week intervals starting 2 weeks after seeding and ending at 50 days after seeding, using a 1 to 9 scale developed by CIAT, where 1= no visible symptoms, 3= 5-10% , 5= 20-30%, 7=40-60%, 9=>80% foliage infection. At 76-79 days after seeding, plants from 2 m² in the center of each plot were harvested and number of pods/plant, weight of 100 seeds, percentage blemished seeds and yield adjusted to 14% moisture were recorded. An ANOVA was run on the data using the MSTAT-C statistical program.

All of the red mottled genotypes were susceptible to WB although there were some differences between genotypes in the percentage yield loss caused by the same severity of WB. A significant linear relationship between WB severity and seed yield in 1995 ($R^2=0.42$) and 1996 ($R^2= 0.59$) was observed for the lines. The disease reduced yield 44 to 61% in commercial PC-50 and PC-21-SM-A and 20 to 47% for JB-178, PC-21-SM-E, AL-9014-9 and NE-8955-66 in both years. Number of pods/plant and seed weight contributed more to reduction of seed yield in 1996 when WB was more severe than in 1995 (Table 1). Seed weight was significantly affected by WB in both years.

Blighting or discoloration of the seed was observed in all of the lines in both years. In 1995 no significant differences in percentage blighted seed were found when fungicide treated and control plots were compared even though there was 18 to 30% seed damage. Despite three

fungicide applications, the fungus continued to grow after 50 days and colonized mature pods from diseased leaves in contact with them. Eventually the pathogen invaded the seed resulting in discolored seeds. Since *R. solani* is a fungus with a high competitive saprophytic ability, it is not surprising that it can rapidly colonize mature or senescent plant parts and continue active mycelial growth under high levels of humidity and mild temperatures (Sneh et al., 1991).

Table 1. Regression analysis of web blight severity and yield components of red mottled bean genotypes grown at Buena Vista, Dominican Republic.

FACTORS

YEAR	# Pods/plant	Seed Weight	% Blighted Seed	Yield
1995	0.17**	0.19**	0.04 ^{ns}	0.42**
1996	0.56**	0.65**	0.89**	0.59**

ns Not significant.

** Prob.< 0.01

In 1996 four fungicide applications were made with the last spray at 50 days after seeding when plants were at pod filling and maturation stage. This treatment significantly decreased the percentage blighted seed from treated compared to control plots. The levels of blighted seed in the control plots, however, were higher than those previously reported for white and colored seeded genotypes tested in the same location (Godoy et al., 1994). PC-50, AL-9014-9 and NE-8955-66 had over 83% of total seed blighted or discolored whereas JB-178 and PC-21-SM-A and PC-21-SM-E had 66-69% damaged seed. A reduction in seed grade can cause serious economic losses to bean growers. The WB pathogen, mainly considered a foliar pathogen, can be detrimental to seeds when infection continues into the pod maturation stage. Red mottled cultivars with improved resistance to WB are needed. Traits, such as disease avoidance due to plant architecture, that contribute to reduced pod and seed damage should be considered in breeding strategies for WB resistance. Under favorable WB conditions other management strategies, such as use of fungicides or cultural methods should be implemented during critical stages of pod and seed maturation.

REFERENCES

- Galvez, G.E., Mora, B. and Pastor Corrales, M.A. 1989. pp 195-209 In: Bean Production Problems in the Tropics. (H.F. Schwartz and M.A. Pastor Corrales Eds.) CIAT, Colombia.
- Godoy-Lutz, G., Arias, J., Steadman, J.R. and Eskridge, K.M. 1996. Plant Dis. 80:887-890.
- Godoy, G., Steadman, J.R., Arias, J., Segura, and Saladin, F. 1994. Ann. Rep. Bean Improv. Coop. 37:69-70.
- Sneh, B., Burpee, L., and Ogoshi, A. 1991. Identification of *Rhizoctonia* species. APS Press. St. Paul, MN.